

cocks attached directly to boilers operating at pressures exceeding 15 pounds per square inch is prohibited.

(e) (*Modifies PG-11.1.1.*) The material, design, construction and workmanship of pumps shall be at least equivalent to the standards established by the American Bureau of Shipping or other recognized classification society. See part 58 of this subchapter.

[CGFR 68-82, 33 FR 18815, Dec. 18, 1968, as amended by CGD 73-254, 40 FR 40163, Sept. 2, 1975; CGD 81-79, 50 FR 9432, Mar. 8, 1985]

**§ 52.01-95 Design (modifies PG-16 through PG-31 and PG-100).**

(a) *Requirements.* Boilers required to be designed to this part shall meet the requirements of PG-16 through PG-31 of the ASME Code except as noted otherwise in this section.

(b) *Superheater.* (1) The design pressure of a superheater integral with the boiler shall not be less than the lowest setting of the drum safety valve.

(2) Controls shall be provided to insure that the maximum temperature at the superheater outlets does not exceed the allowable temperature limit of the material used in the superheater outlet, in the steam piping, and in the associated machinery under all operating conditions including boiler overload. Controls need not be provided if the operating superheater characteristic is demonstrated to be such that the temperature limits of the material will not be exceeded. Visible and audible alarms indicating excessive superheat shall be provided in any installation in which the superheater outlet temperature exceeds 454 °C (850 °F). The setting of the excessive superheat alarms must not exceed the maximum allowable temperature of the superheater outlet, which may be limited by the boiler design, the main steam piping design, or the temperature limits of other equipment subjected to the temperature of the steam.

(3) Arrangement shall be made for venting and draining the superheater in order to permit steam circulation through the superheater when starting the boiler.

(c) *Economizer.* The design pressure of an economizer integral with the boiler and connected to the boiler drum without intervening stop valves shall be at

least equal to 110 percent of the highest setting of the safety valves on the drum.

(d) *Brazed boiler steam air heaters.* Boiler steam air heaters utilizing brazed construction are permitted at temperature not exceeding 525 °F. Refer to § 56.30-30(b)(1) of this subchapter for applicable requirements.

(e) *Stresses.* (*Modifies PG-22.*) The stresses due to hydrostatic head shall be taken into account in determining the minimum thickness of the shell or head of any boiler pressure part unless noted otherwise. Additional stresses, imposed by effects other than internal pressure or static head, which increase the average stress over substantial sections of the shell or head by more than 10 percent of the allowable stress shall be taken into account. These effects include the weight of the vessel and its contents, method of support, impact loads, superimposed loads, localized stresses due to the reactions of supports, stresses due to temperature gradients and dynamic effects.

(f) *Cylindrical components under internal pressure.* (*Modifies PG-27.*) The minimum required thickness and maximum allowable working pressure of boiler piping, tubes, drums and headers shall be as required by the formula in PG-27 of the ASME Code except that threaded boiler tubes are not permitted.

[CGFR 68-82, 33 FR 18815, Dec. 18, 1968, as amended by CGD 81-79, 50 FR 9432, Mar. 8, 1985]

**§ 52.01-100 Openings and compensation (modifies PG-32 through PG-39, PG-42 through PG-55).**

(a) The rules for openings and compensation shall be as indicated in PG-32 through PG-55 of the ASME Code except as noted otherwise in this section.

(b) (*Modifies PG-39.*) Pipe and nozzle necks shall be attached to vessel walls as indicated in PG-39 except that threaded connections shall not be used under any of the following conditions:

(1) Pressures greater than 4137 kPa (600 psig);

(2) Nominal diameters greater than 51mm (2 in.); or

(3) Nominal diameters greater than 19mm (0.75 in.) and pressures above 1034 kPa (150 psig).

(c) (*Modifies PG-42.*) Butt welding flanges and fittings must be used when full radiography is required by § 56.95-10.

[CGD 81-79, 50 FR 9432, Mar. 8, 1985]

**§ 52.01-105 Piping, valves and fittings (modifies PG-58 and PG-59).**

(a) Boiler external piping within the jurisdiction of the ASME Code must be as indicated in PG-58 and PG-59 of the ASME Code except as noted otherwise in this section. Piping outside the jurisdiction of the ASME Code must meet the appropriate requirements of part 56 of this subchapter.

(b) In addition to the requirements in PG-58 and PG-59 of the ASME Code, boiler external piping must:

(1) Meet the design conditions and criteria in § 56.07-10 of this subchapter, except § 56.07-10(b);

(2) Be included in the pipe stress calculations required by § 56.31-1 of this subchapter;

(3) Meet the nondestructive examination requirements in § 56.95-10 of this subchapter;

(4) Have butt welding flanges and fittings when full radiography is required; and

(5) Meet the requirements for threaded joints in § 56.30-20 of this subchapter.

(c) Steam stop valves, in sizes exceeding 152mm (6 inch) NPS, must be fitted with bypasses for heating the line and equalizing the pressure before the valve is opened.

(d) *Feed connections.* (1) Feed water shall not be discharged into a boiler against surfaces exposed to hot gases or radiant heat of the fire.

(2) Feed water nozzles of boilers designed for pressures of 2758 kPa (400 psi), or over, shall be fitted with sleeves or other suitable means employed to reduce the effects of metal temperature differentials.

(e) *Blowoff connections.* (1) Firetube and drum type boilers shall be fitted with a surface and a bottom blowoff valve or cock attached directly to the boiler or to a short distance piece. The surface blowoff valve shall be located within the permissible range of the water level, or fitted with a scum pan or pipe at this level. The bottom blowoff valve shall be attached to the lowest part of the boiler or fitted with an

internal pipe leading to the lowest point inside the boiler. Watertube boilers designed for pressures of 2413 kPa (350 psig) or over are not required to be fitted with a surface blowoff valve. Boilers equipped with a continuous blowdown valve on the steam drum are not required to be fitted with an additional surface blowoff connection.

(2) Where blowoff pipes are exposed to radiant heat of the fire, they must be protected by fire brick or other suitable heat-resisting material.

(f) *Dry pipes.* Internal dry pipes may be fitted to the steam drum outlet provided the dry pipes have a diameter equal to the steam drum outlet and a wall thickness at least equal to standard commercial pipe of the same diameter. Openings in dry pipes must be as near as practicable to the drum outlet and must be slotted or drilled. The width of the slots must not be less than 6mm (0.25 in.). The diameter of the holes must not be less than 10mm (0.375 in.). Where dry pipes are used, they must be provided with drains at each end to prevent an accumulation of water.

[CGD 81-79, 50 FR 9432, Mar. 8, 1985]

**§ 52.01-110 Water-level indicators, water columns, gauge-glass connections, gauge cocks, and pressure gauges (modifies PG-60).**

(a) *Boiler water level devices.* Boiler water level devices shall be as indicated in PG-60 of the ASME Code except as noted otherwise in this section.

(b) *Water level indicators.* (*Modifies PG-60.1.*) (1) Each boiler, except those of the forced circulation type with no fixed water line and steam line, shall have two independent means of indicating the water level in the boiler connected directly to the head or shell. One shall be a gage lighted by the emergency electrical system (See Subpart 112.15 of Subchapter J (Electrical Engineering) of this chapter) which will insure illumination of the gages under all normal and emergency conditions. The secondary indicator may consist of a gage glass, or other acceptable device. Where the allowance pressure exceeds 1724 kPa (250 psi), the gage glasses shall be of the flat type instead of the common tubular type.